

PinPrick stimulators with contact trigger

Description of modification of standard stimulators and electronic device

1. Intended use

The trigger can be used to determine the conduction velocity of nerves. As soon as the tip of a PinPrick stimulator reaches its nominal force on the skin, a trigger signal is generated. This trigger can be sent to a stop watch, an EEG recorder or any other device.

2. Safety instructions



- The safety instructions included in the user manual of the standard PinPrick stimulators (series PP05) are also valid for the modified stimulators.
- Cables are permanently connected to the stimulators. They are not specially secured against tensile forces. Please avoid any strong tensile force effect on these cables.

3. Description of the standard stimulators' modifications

- An electrical switch is integrated into the PinPrick and connected to an external cable in order to detect the movement of the needle. For this purpose the internal sliders are electronically connected. The needle's tip is electrically insulated from the switch and any electric potential.
- In a standard stimulator the internal weights are configured with a plastic ending which stops the weight from falling out at the lower attachment point of the metallic guiding tube. Now we have added a plastic inlay (PEEK) at the attachment point in order to insulate the switches' contacts from the metallic tube.
- The guiding tubes of the stimulators are surrounded by an insulating material.
- The laser graving is substituted by a label on the insulating material.
- The stimulators with the weights of 8 mN and 16 mN are not available with the contact trigger. The electronic bonding would overly increase the weight.

Figure 1 shows a modified stimulator.



Figure 1: Modified PinPrick stimulator

4. Electronic device

4.1 Measurement principle

The measurement principle for the trigger circuit is based on a circuit breaking contact switch. Hereby, the switch opens when the needle starts to move from its lower position into the stimulator's tubing. In this situation the nominal force of the slider's weight is applied to the skin.

4.2 Description

The following figure 2 shows the front panel of the electronic device. The functions can be explained with reference to this figure.



Figure 2: Electronic device for detection of a contact stimulus (1 channel)

On-off-switch

The on-off-switch is placed on the lower left side of the front panel. An LED light above the switch indicates if the device is switched on.

Inputs and outputs

The input for the stimulator (“PinPrick”) is placed at the lower center of the front panel. Beside this connector are the respective outputs (“Trigger”). Whenever a stimulator is connected to the input and the PinPrick needle tip reaches its nominal force on the skin the corresponding outputs deliver a standard TTL signal (5V HIGH). These signals can be used to start a stop watch or to trigger a device.

The electronic box provides two different output types:

- The left trigger output marked with a pole symbol generates a TTL signal with a width of 10 ms where the rising edge indicates the start of the stimulus. This output can be used for devices expecting a trigger pulse.
- The right trigger output marked with a step symbol stays high as long as the stimulus is present.

The LED lights above the Trigger outputs indicate that a trigger was provoked.

Ground connection

The device can be connected to ground by means of the plug marked with the ground signal. A cable with a banana plug can be used to establish a connection to the protective earth of a plug socket (see also the instructions for use in section 5 below).

Power supply

The device is powered by an integrated low voltage battery. It can be charged by means of the wall power supply which is included in the delivery. The wall power supply is connected at the rear side of the device. At the front panel there are two indicators for the battery status:



The power supply is currently re-charging the battery.



The battery should be charged as soon as possible.

5. Instructions for use



- Please note that the trigger output with step symbol is at high level when no stimulator is connected to the “PinPrick” input. In that case the detection circuit is open.
- The outputs of the trigger electronics are isolated from the power supply. Nevertheless, depending on the location, connected measuring instruments may be affected. If the trigger output interferes with the measurement of connected devices, you should try the measurement with ground connection.

6. Additional instructions for the use of more than one stimulator

In addition to the electronic device as shown in figure 2 we also offer devices with more than one channel. Figure 3 shows the example of a two-channel device. If you are working with more than one stimulator and/or an electronic device with more than one channel, you should consider the following information.

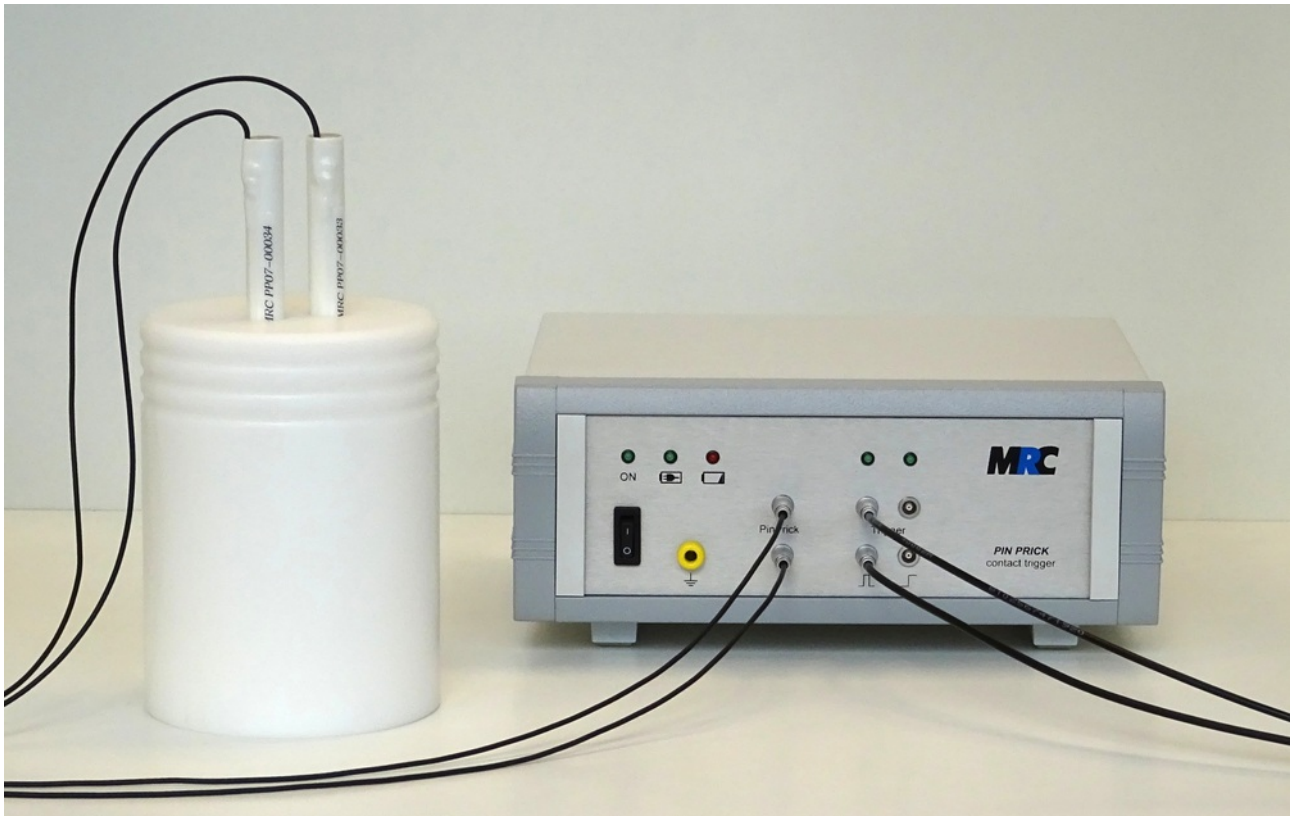


Figure 3: Electronic device with 2 channels. A holder for a safe storage is also shown.



- If only one stimulator is connected to a device with more than one channel, the other channels must be terminated with a short-circuit plug (labelled “short”). This is necessary because the different channels share the LED indicators of the triggers and, in the case of the 6-channel electronics, the pulse trigger output is also shared. If even one of the PinPrick trigger switches opens, the pulse trigger output will give a signal. If an input is open, then this has the same effect as an open switch, i.e. an actuated trigger.
- If more than one PinPrick stimulator is connected to the device, you have to take care that all stimulators which are connected but not used for stimulation are in a vertical position. This can e.g. be done by placing them in the holder. In that way it is guaranteed that any stimulator which is not in use has a closed switch and does not trigger.

7. Technical data

Power supply	Li-ion battery, nominal 3.7V; charge supply 5V, 0.8A
Cable at the stimulators	Length: 2 m Connector: Lemo FFA.00.250.CTA.C22 Plug: Lemo ERN.00.250.CTL
Cable at trigger output	Lemo to BNC
Weight of electronic device	1.0 kg

8. Contact

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